Request for Information (RFI) SN08-39: Multi-Modal Layered Analysis of Network Architectures for Threat Detection & Prediction (LANA)

The Defense Advanced Research Projects Agency (DARPA) seeks to explore the mathematics, network theory, analytical techniques and visualization techniques required to enable Multi-Modal Layered Analysis of Network Architectures for Threat Detection & Prediction. In order to further explore this, DARPA's Information Processing Techniques Office (IPTO) invites white papers describing innovative ideas and concepts from all those engaged in related research activities.

BACKGROUND AND AREAS OF INTEREST

Disparate work in the area of network analysis (including but not limited to such domains as logistical networks and computer networks) has led to advancement of capabilities, but has fallen short of full potential. Treating these network types as individual, stovepiped analytical problems is to ignore the implications of multi-network interactions. Any given network must exist in concert with multiple other networks of varying type which both feed off of and affect the network in question. The result is that we must analyze not only one type of network, but an interconnected stack of various network types in order to more accurately detect and understand anomalies, and where feasible to make predictions. DARPA's focus of interest in the area of Multi-Modal Layered Analysis of Network Architectures for Threat Detection & Prediction involves:

(**A**) completing the emerging unified network theory base,

(**B**) developing techniques to analyze multi-modal network stacks to detect and predict anomalies in network dynamics and characteristics, and

(**C**) developing intelligent, adaptable visualizations and presentations tailored on the fly to individual analyst needs.

WORKSHOP

A DARPA-sponsored workshop has been planned for **August 26-27, 2008 in Arlington, Virginia, USA** for the purpose of reviewing on-going research in these areas. Information presented at the workshop may contribute to the formulation of future areas of DARPA research. PLEASE NOTE THAT SPACE FOR THE WORKSHOP IS LIMITED AND ATTENDANCE WILL BE BY INVITATION ONLY. Invitations will be based on white papers submitted per the instructions below, no later than **1200 (Noon) ET, July 14th, 2008**. These white papers should briefly summarize approaches, and not exceed 5 pages, including figures.

Authors may be invited to present related work and on-going non-proprietary research activities associated with their submissions at the workshop including:

- Multi-modal network analysis techniques
- Automated generation and update of prediction tools based on evolving network characteristics
- Network anomaly detection and characterization
- Adaptive visualization
- Information theory and associated taxonomies

- Predictive modeling in dynamic networks
- Mathematical modeling of all levels of network interrelationships
- Plausible prediction of possible intervention effects

Accepted authors will be notified via email by COB **August 1st, 2008** and will be invited to provide a 15 minute unclassified, non-proprietary presentation, with five minutes for questions.

ELIGIBILITY

DARPA appreciates responses from all capable and qualified sources, including but not limited to, universities, university-affiliated research centers, federally-funded research centers, private or public companies, and Government research laboratories.

WHITE PAPER SUBMISSION INSTRUCTIONS AND FORMAT

DARPA will employ an electronic upload system for responses to this RFI. To respond to the RFI, interested parties must complete an online cover sheet for each white paper response, which will include the information outlined below. The coversheet submission site is https://www.csc-ballston.com/rfi/rfiindex.asp?RFIid=08-39. Upon completion of the online cover sheet, a confirmation screen will appear, along with instructions on uploading the white paper.

All white paper submissions must be formatted in either Microsoft Word or Adobe PDF and encrypted using Winzip or PKZip with 256-bit AES encryption. Only one zipped/encrypted file will be accepted per white paper and white papers not zipped/encrypted will be rejected by DARPA. An encryption password must be emailed to RFI08-39@darpa.mil **at the time of white paper submission. Note the word "PASSWORD" must appear in the subject line of the above email. Failure to provide the encryption password may result in the white paper not being read.**

Since candidate authors may encounter heavy traffic on the web server, they SHOULD NOT wait until the day submissions are due to fill out a coversheet and submit the white paper!

DARPA will acknowledge receipt of submissions via email within 3 business days of the deadline.

White papers should adhere to the following formatting and outline instructions:

1. Page format specifications include: 10 point Verdana font, single spaced, single-sided, 8.5 by 11 inches paper, with 1-inch margins. All white papers must be written in English. All submissions must be formatted in either Microsoft Word or Adobe PDF and zipped. NO CLASSIFIED INFORMATION SHOULD BE INCLUDED IN THE RFI RESPONSE. Proprietary information is acceptable in the whitepaper RFI response, but cannot be used in the workshop presentation (if one is requested).
2. Cover Page (1 page)
    a. Title;
    b. Organization;
    c. Responder's technical and administrative points of contact (names, addresses, phones and fax numbers, and email addresses);
    d. Topic area(s) addressed (THEORY, ANALYSIS, VISUALIZATION); and
    e. Name of technical POCs (up to 2) who would attend the workshop, if invited

   f. Citizenship of technical POCs (up to 2) who would attend the workshop, if invited
3. Technical Ideas (up to 5 pages)
   a. Page 1
      i. Executive summary; and
      ii. A discussion of the capability/challenge addressed (from your perspective);
   b. Technical Response (up to 3 pages) - Your discussion should address the following:
      i. What is your suggested innovative technology/concept/approach?
      ii. How does it address the specific capability/challenge?
      iii. What is the current capability versus the desired capability?
      iv. What extensions or advances are needed to achieve the goals addressed?
   c. Brief summary (up to 1 page) of any relevant experience in the chosen area.
4. An optional list of citations, including URLs, if available. (up to 1 page)

Candidate authors are encouraged to be as succinct as possible while at the same time providing actionable insight.

DISCLAIMERS AND IMPORTANT NOTES

This is an RFI issued solely for information and possible new program planning purposes; the RFI and workshop do not constitute a formal solicitation for proposals. In accordance with FAR 15.201(e), responses to this notice are not offers and cannot be accepted by the Government to form a binding contract. Submission of a white paper, and/or attendance at the workshop, is voluntary and is not required to propose to subsequent Broad Agency Announcements (if any) or research solicitations (if any) on this topic. DARPA will not provide reimbursement for costs incurred in responding to this RFI or participating in the RFI workshop. NO CLASSIFIED INFORMATION SHOULD BE INCLUDED IN THE RFI RESPONSE. Candidate authors are advised that DARPA is under no obligation to provide feedback to candidate authors with respect to any information submitted under this RFI.

Submissions may be reviewed by: the Government (DARPA and partners); Federally Funded R&D Centers (such as MIT, Lincoln Laboratory); and Systems Engineering and Technical Assistance (SETA) contractors (such as Schafer Corporation, Science and Technology Associates, CACI International, and System Analysis, Inc.).

POINT OF CONTACT

Dr. Amy K. C. S. Vanderbilt, IPTO Program Manager, DARPA, Email RFI08-39@darpa.mil. ANY INQUIRIES ON THIS RFI AND/OR WORKSHOP MUST BE SUBMITTED TO RFI08-39@darpa.mil. NO TELEPHONE INQUIRIES WILL BE ACCEPTED.